

REMARKS

At the outset, the Examiner is thanked for the thorough review and consideration of the pending application. The Office Action dated November 20, 2009 has been received and its contents carefully reviewed.

The Examiner is also thanked for the in-person interview with Applicants' representative on March 2, 2010. The comparison of the polyimide precursor of claim 1 and the references' structures (*Jung* and *Okada*) was discussed. The Examiner indicated that unexpected result of the claimed invention compared to the Comparative examples 1 and 2 in Table 1 of the Specification may be acceptable if Applicants can show the result as numerical physical data which supports the superiority of the polyimide precursor of claim 1.

Claims 1 and 3-17 are currently pending, of which claims 4-17 are withdrawn from consideration. Reexamination and reconsideration of claims 1 and 3 are respectfully requested.

The Office Action rejected claims 1 and 3 under 35 U.S.C. §103(a) as being unpatentable over U.S. Patent Application Publication No. 2002/0093077 to Jung et al. (hereinafter "*Jung*") in view of U.S. Patent Application Publication No. 2004/0048978 to Okada et al. (hereinafter "*Okada*") and U.S. Patent Application Publication No. 2004/0048004 to Hosaka et al. (hereinafter "*Hosaka*"), and further in view of U.S. Patent No. 6,664,021 to Maeda et al. (hereinafter "*Maeda*") or U.S. Patent No. 6,159,654 to Machida et al. (hereinafter "*Machida*"). Applicants respectfully traverse the rejection.

In order to establish *prima facie* obviousness of the claimed invention, all the elements must be taught or suggested by the prior art. Obviousness can be established by combining or modifying the teachings of the prior art to produce the claimed invention where there is some teaching, suggestion, or motivation to do so. M.P.E.P. § 2143.01. The mere fact that reference can be combined does not render the resultant combination obvious unless the results would have been predictable to one of ordinary skill in the art. M.P.E.P. § 2143.01(III). The combined teachings of *Jung*, *Okada*, *Hosaka*, and *Maeda* or *Machida* fails to teach or suggest every element of claims 1 and 3, and thus, cannot render these claims obvious.

Claim 1 recites, “Y is a di-valent organic group derived from aliphatic, alicyclic, or non-conjugated aromatic diamines which have 3-30 carbon atoms and side chains, wherein the side chains have one or more ethylenically unsaturated bonds capable of being crosslinked by a radical...wherein the acid value of said reactive transparent polyimide precursor is within a range of 30 to 200 mg KOH/g, and said reactive transparent polyimide precursor is a negative type photosensitive precursor.” The Office Action mistakenly concludes that this feature of claim 1 would have been obvious in view of the combined teachings of *Jung*, *Okada*, *Hosaka*, and *Maeda* or *Machida*. Applicants respectfully disagree for the following reasons.

First, as the Office Action admits, *Jung* fails to disclose “Y has an ethylenically unsaturated bond” and the photosensitive precursor is “negative type” as recited in claim 1. *See Office Action*, pages 3 and 5.

Second, *Jung* fails to teach or suggest that “the acid value of said reactive transparent polyimide precursor is within a range of 30 to 200 mg KOH/g.” The Office Action alleges that the acid value of *Jung* is within the range of “30 to 200 mg KOH/g” as recited in claim 1, because R₁ and R₂ of claim 1 and those of *Jung* can be “independently...hydrogen atom.” *See Office Action*, page 3. Applicants respectfully disagree. The acid value of the polyimide precursor of claim 1 is determined not only by the carboxylic groups (R₁OOC and R₂OOC when R₁ or R₂ is hydrogen), but also by the Y group in the Chemical Formula 1. Y group of claim 1 is defined as a “di-valent organic group derived from aliphatic, alicyclic, or non-conjugated aromatic diamines which have 3-30 carbon atoms and side chains, wherein the side chains have one or more ethylenically unsaturated bonds capable of being crosslinked by a radical.” According to the present Specification, examples of diamines for Y group include “2-(methacryloyloxy)ethyl 3,5-diaminobenzoate, 3,5-diaminophenyl cinnamate, coumaronyl 3,5-diaminobenzoate, etc.” and all the Y group are acidic. *See Specification*, ¶ [0025]. However, *Jung* only discloses Y groups derived from saturated non-acidic diamines, and therefore *Jung*’s Y group does not affect the acid value of the polyimide precursor. *See Jung*, ¶ [0061]. As the acid value of *Jung* cannot be equated with that of claim 1, *Jung* does not teach or suggest the above features as recited in claim 1.

Third, even though the Office Action relies on *Okada*, *Hosaka*, and *Maeda* or *Machida* to cure the deficiency of “Y...have one or more ethylenically unsaturated bonds” and the

photosensitive precursor is “negative type” as recited in claim 1, these combinations, however, is improper to establish a *prima facie* case of unpatentability.

Diamines having ethylenically unsaturated bond(s) disclosed in *Okada* cannot be combined with that of *Jung*. In fact, *Jung* actually teaches away from the combination of Y group of *Okada* with that of *Jung*. Applicants respectfully submit the Declaration of Dr. Kyung-jun Kim with this response and request that the Examiner fully consider the Declaration. As stated in the Declaration, the acid value of the polyimide precursor is closely related to acid value. When an acid value is high, the polyimide precursor will be negative type because it will be easily soluble in the alkali solution. Here, *Jung*’s polyimide precursor is positive-type (See *Jung*, ¶ [0094]), and it should not have an acid value enough to dissolve itself in the alkali solution until the light exposure when making a polyimide film. However, as discussed above, all the Y group of *Jung*’s compound has not been derived from an acid, and thus does not affect the acid value of the whole compound. Therefore, *Jung* actually teaches away from the combination of *Okada*’s acidie Y group with Y position of *Jung*. Because neither of the references, singularly or in combination teach all the claimed elements by the above reasons, the teachings of *Jung* in view of *Okada* do not render claim 1 obvious.

Hosaka is introduced to cure the deficiency of alicyclic tetracarboxylic acid. See *Office Action*, page 4. However, *Hosaka* also fails to teach or suggest the above mentioned features of claim 1, and thus cannot cure the deficiency of *Jung* and *Okada*.

Maeda or *Machida* are introduced to cure the deficiency of “negative type photosensitive precursor” of claim 1. See *Office Action*, page 5-7. However, *Maeda* or *Machida* also fails to teach or suggest the elements of “Y is a di-valent organic group derived from aliphatic, alicyclic, or non-conjugated aromatic diamines which have 3-30 carbon atoms and side chains, wherein the side chains have one or more ethylenically unsaturated bonds capable of being crosslinked by a radical... wherein the acid value of said reactive transparent polyimide precursor is within a range of 30 to 200 mg KOH/g” as recited in claim 1. Therefore, *Maeda* and *Machida* cannot cure the deficiency of *Jung*, *Okada* and *Hosaka*.

Finally, the claimed invention leads to unexpected results. As stated in the Declaration of Mr. Kyung-Jun Kim, Comparative Examples 1 and 2 of the present Specification uses 4,4-

oxydianiline(ODA) as Y group which falls within the definition of *Jung*'s compound Y, i.e., "Y is a divalent, an aromatic or an aliphatic organic group." See *Specification*, ¶¶ [0066] to [0087] and Table 1. However, as shown in Table 1 of the present *Specification* and the Declaration of Mr. Kyung-Jun Kim, the chemical resistance and the degree of planarization of the films of Comparative Examples 1 and 2 are inferior to those of the claimed invention (See *Specification*, Preferred Embodiments 1-3). Therefore, Applicants respectfully request the Examiner consider these unexpected results. *Id.*

For at least the aforementioned reasons, the Applicants respectfully submit that claim 1 is patentably distinguishable over *Jung* in view of *Okada*, *Hosaka*, and *Maeda* or *Machida* and request that the rejection be withdrawn. Likewise, claim 3, which depends from claim 1 is also patentable for at least the same reasons as discussed above.

The application is in condition for allowance. Early and favorable action is respectfully solicited. If for any reason the Examiner finds the application other than in condition for allowance, the Examiner is requested to call the undersigned attorney at (202) 496-7500 to discuss the steps necessary for placing the application in condition for allowance. All correspondence should continue to be sent to the below-listed address.

If these papers are not considered timely filed by the Patent and Trademark Office, then a petition is hereby made under 37 C.F.R. § 1.136, and any additional fees required under 37 C.F.R. § 1.136 for any necessary extension of time, or any other fees required to complete the filing of this response, may be charged to Deposit Account No. 50-0911. Please credit any overpayment to deposit Account No. 50-0911.

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Respectfully submitted,

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